Our Productive *Land...*

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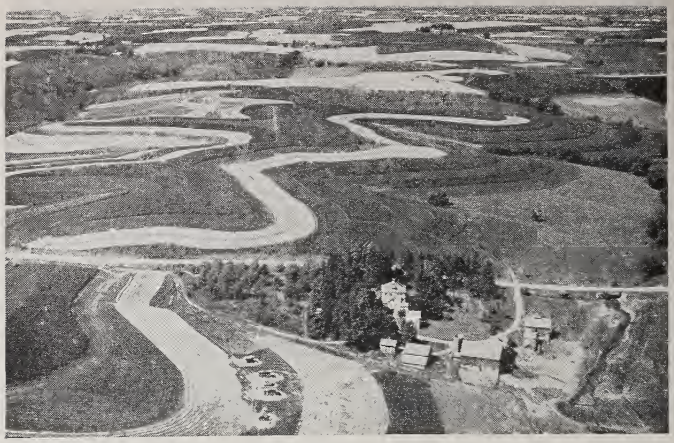


OUR PRODUCTIVE LAND

We Can Conserve and Improve It While Using It

By the *Soil Conservation Service*

Land—productive land on which good crops, pastures, or forests will grow—is our most valuable resource. Whether you live in a city or in the country, the land feeds and clothes you and gives you most of the other things you use.

Productive land is essential to the well-being of any nation and its people. Many nations do not have enough good land now to furnish a high standard of living. We are more fortunate in the United States; but, even here, we do not have much to spare. And most of our land has been getting poorer—the potential productivity has been declining year after year ever since we settled it.

Fertile soil and the right amount of water are the main things that make land productive. A great part of our land had fertile

soil when we first settled it. But erosion, overcropping, the oxidation of organic matter, the leaching of minerals, and other things have robbed the soil of a great part of its fertility. Much of our land had the right amount of water when we settled it. But increased runoff has decreased the supply of water in the soil on many sloping hillsides; while flooding and waterlogging have increased the amount of water in the soil of valley lands. These and other things have greatly decreased the potential productivity of too much of our land.

We do not need to let the productivity of the land continue to decline. We can check erosion, build up soil fertility, and regulate the supply of water so that the land will produce more and more, year after year. We can conserve and improve the soil so that future generations will have the same abundant life we now enjoy. But to do this we must use the best soil and water conservation practices we know about. And we must fit these conservation practices to the land of each field, each farm, and each watershed.

This bulletin gives some facts and figures about what has happened to our land, and it gives some information about how we can conserve and improve it while using it.

SOIL EROSION

Soil is not permanent. Under many conditions it is very unstable. Water or wind moving across bare ground usually carries some soil away. It may be moved hundreds of miles or only a few feet, but eventually large amounts of soil will be removed from any unprotected or misused area.

Dense plant growth helps to slow down the movement of soil by water or wind. This gives nature time to replace what little soil is removed by erosion. Nature does this by forming new topsoil from the underlying subsoil or rock and the decayed remains of plants and animals. This slow process of constant erosion and new soil formation is known as "natural erosion," or "geologic erosion." It has been going on for millions of years; it is usually beneficial instead of harmful. Most of our good agricultural soils were formed this way.

But, where land is cultivated or left bare, another and faster kind of erosion takes place. This is accelerated erosion. When land is cultivated there is no dense growth of plants to protect the soil, and erosion may be a thousand times faster than on protected soil. Accelerated erosion also damages grasslands where the grass is thinned by overgrazing or misuse. And it damages woodlands that are mismanaged. This accelerated erosion is what we now commonly call soil erosion.

Erosion has damaged, or ruined for practical use, hundreds of millions of acres of once-productive land all over the world. In some places, such as North Africa, the Near East, and parts of China, erosion has damaged so much of the land that formerly rich agricultural areas are now almost like deserts. Erosion has also taken a terrific toll from formerly rich lands in the United States.

Erosion has severely damaged about 280 million acres of crop and grazing land in the United States. Another 775 million acres of crop, grazing, and forest land have eroded to some extent. We now have left in the farms and ranches of the country about 460 million acres of land that is suitable for cultivated crops. This includes, besides land now in crops, about 95 million acres that need clearing, draining, irrigating, or other improvements to make them suitable for cultivation. All but about 100 million of this 460 million acres are subject to erosion if not protected.

LOSS OF PRODUCTIVITY

Soil erosion is only one cause of declining productivity of our land. Organic-matter deterioration is also serious. Much of the organic matter has decayed or been oxidized on a large part of the clean-tilled land. This has made the soil less fertile and the land harder to cultivate.

Some of the plant-food minerals have leached out of the soil, especially on sandy or other porous soils. This has lowered soil fertility. The removal of plant nutrients by crops has also lowered the fertility of land that has been farmed for a long time. Furthermore, much of the commercial fertilizer applied each year is lost through runoff from cultivated fields.

Erosion and the loss of organic matter on farmland have made many soils less permeable. They will not absorb water as rapidly as they once would. A greater amount of the rainfall runs off sloping land. Thus there is not as much water in the soil to produce crops; yields are much lower during droughty seasons. The amount of runoff has also increased on much of the pasture and rangeland that has been grazed too closely. And it has greatly increased on sloping forest land where the trees have been cut or burned.

The increased runoff from hillsides also damages valley land. Floods are more frequent; they wash out crops and scour away the soil. In many valleys large deposits of subsoil eroded from the hillsides are left on top of the fertile soil. Most of the mineral plant food has been leached out of these silt deposits; the fertility is usually very low. Furthermore, such silt deposits often block the drainageways and make the land too wet for good farming.

All these things have damaged the land and made it less productive. We still have enough good land left in the United States to support us; but we can't keep our present standard of living if we continue to let our soils deteriorate.

SOIL CONSERVATION

Soil conservation means more than preventing erosion, checking runoff, and stopping the depletion of soil nutrients. True conservation means using the land to produce the greatest amounts of the things most needed while protecting and improving it.

Soil conservation must start by protecting the land against all forms of soil depletion. But it does not stop there. Effective conservation will improve the land so that it will produce more and more, year after year—more corn, cotton, wheat, and vegetables, more grass and livestock, and more timber.

Modern soil conservation is based on research and farmer experience all over the country. It is continually being improved, as research and experience point out better ways to conserve and use soil and water resources.

All measures that help protect or improve the land are tools of conservation. Terraces, contours, cover crops, strip crops, crop rotation, fertilizers, lime, legumes, grass, stubble mulch, trees, shrubs, drainage, irrigation, and many other measures are conservation tools. Each conservation practice will help protect or improve the land if used in the right place and in the right way. But in most places several practices must be used together and in the right combination to get true conservation.

Soil conservation does even more than protect and improve the land. It directly or indirectly brings about a variety of benefits. It helps lower the cost of farm production. This, in turn, increases farmers' profits and helps lower the cost of food and clothing to people living in cities. Soil conservation helps check drought damage. It helps give cities and towns a cleaner and more dependable water supply. It reduces siltation of streams, reservoirs, and harbors. It reduces flood crests on both small and large streams. It lessens damage to oyster beds and breeding and feeding grounds of fish, crabs, and other valuable aquatic life. It helps increase the amount of beneficial wildlife. It improves many of our recreational facilities. And it helps give all of us a cleaner and more beautiful country.

THE SOIL CONSERVATION SERVICE

Soil conservation did not receive much attention in the United States until the 1930's. As long as we had plenty of unsettled land, conservation did not seem important. A few farmers took good care of their land, but many farmers let theirs deteriorate and erode until it was worn out and then moved to other land.

We didn't have a national program of soil conservation until the Soil Erosion Service was created as an emergency agency in the United States Department of the Interior in 1933. In 1935 Congress passed our first National Soil Conservation Act. It transferred the Soil Erosion Service to the Department of Agriculture and named it the Soil Conservation Service (SCS). Since then Congress has supplemented the Soil Conservation Act with several other laws.

The early work of the Soil Conservation Service was largely research to find better conservation methods and demonstration of those methods to farmers. Demonstration projects were set up in all parts of the country between 1933 and 1936. Farmers and ranchers in these areas cooperated with the SCS by installing complete conservation programs. These demonstrations created a lot of interest in soil conservation.

In 1937 the States began to pass laws that permitted farmers and ranchers to organize their own soil conservation districts. Then the Soil Conservation Service began to do most of its conservation work in cooperation with these districts.

SOIL CONSERVATION DISTRICTS

Soil conservation districts are local units of government, operating under State laws. Most of them are about the size of a county. Each is organized and run by the farmers and ranchers living in it.

By 1948 all States and Territories had passed soil conservation district laws. By 1953 more than 2,500 districts had been created, and others were still being organized.

In these self-governing districts farmers and ranchers cooperate to protect their land. They often work in groups, helping each other apply good land use and conservation measures to their land.

The Soil Conservation Service and other Federal and State agencies furnish technical, educational, and other types of aid to the districts.

DISTRICTS PLAN FOR THE FUTURE

Each soil conservation district draws up a conservation program that sets forth all conservation work needed and outlines methods for getting the work done. This program serves as a blueprint for work plans of the district. It is made as soon as possible after the district is organized and is usually based on a soil survey made by soil scientists of the Soil Conservation Service in cooperation with State agricultural colleges.

Most districts have both short-time and long-time work plans. Some conservation problems are so acute that they can't wait. Other problems can wait a few years without much injury to the land. The supervisors of a district usually plan to work first in those areas that need help most.

After the conservation program and work plans for a district have been made, conservation plans for the individual farms and ranches in the district are started. An individual plan is needed for each farm or ranch because each is operated as a separate unit. But each farm or ranch plan must dovetail into the plans for neighboring farms or ranches to give full protection to all the land in a watershed. And each plan should fit into the overall program of the district.

FARM AND RANCH CONSERVATION PLANS

Any farmer or rancher may become a cooperator with his soil conservation district by agreeing to conserve and use his land properly. Each farmer or rancher starts his conservation plan as soon as he becomes a cooperator with the district. It may be several months or years, however, before his plan is completed. That depends mainly on how rapidly the farmer or rancher wishes to go ahead with his conservation work, and on how soon the district can furnish him technical aid.

Conservation plans are developed gradually. The farmer or

rancher starts by using those conservation measures that he knows are good for his land. He may be able to apply a part of the conservation work needed, but often he will not know exactly what kind of soil he has or what specific conservation measures are needed. He may need technical advice before he can go very far with his conservation program. This depends largely on how complex his problems are and on how much knowledge he has about soil conservation.

As soon as possible after a farmer or rancher has become a cooperator, the soil conservation district sends a soil scientist to survey the farm or ranch and make a soil map of it. The soil scientist is usually a technician of the Soil Conservation Service who has been assigned to work with the district. He may make the maps within a few weeks after the farmer or rancher becomes a cooperator, or he may not make them for several months. That depends mainly on how many other farmers and ranchers are on the district's waiting list.

A land-capability map is prepared from the soil map. When it has been completed, it is given to the farmer or rancher, along with a conservation guide. The map shows the farmer or rancher what kind of land he has in each field. The guide gives general instructions on different ways each kind of land can be used and treated. By following the map and guide he may be able to plan many of the needed land use changes and soil conservation measures.

But the farmer or rancher will usually want technical advice to help him work out the details for his final, *basic* conservation plan. The district sends a Soil Conservation Service technician, known as a farm planner, to give such help as soon as possible after the land-capability map has been made. This may be within a few

weeks, or it may be several months, depending largely on how many others are on the waiting list.

PRACTICAL LAND MAPS

Each tract of land is different. The kind of soil, the slope, the degree of erosion, and the fertility and physical condition of the soil vary from place to place. And the climate varies. Altogether, there are thousands of different kinds of land. In fact, no two patches of land are exactly alike.

The important things for a conservationist to know about land, however, are what it can be used for safely and how it should be treated to keep it productive. The land-capability maps put land into eight broad classes, according to how good the land is and what it can be used for. Each class is shown by a different color or a Roman numeral on the map.

Of the 8 broad land classes 3 are suited for cultivation, 1 is suited for limited cultivation, and 4 are not suited for any cultivation. Here are descriptions of the eight broad land classes.

Class I. Very good land for cultivation. Nearly level and productive; not subject to erosion. Needs only ordinary good farming methods. (Light green.)

Class II. Good land for cultivation. Usually gently sloping, but only moderately erosive. Some needs drainage. Can be farmed safely with easily applied conservation practices. (Yellow.)

Class III. Fairly good land for cultivation. Usually moderately sloping and subject to water erosion in humid areas. Subject to wind erosion in the Great Plains. Some too wet or too dry for cultivation without drainage or irrigation. Can be farmed safely with intensive conservation measures. (Red.)

Class IV. Fairly good land that is best suited for pasture or hay but can safely be cultivated occasionally. Generally it has steep slopes; often it is shallow or very sandy. Some is in a climate that is too dry for continuous cultivation. It must be handled with great care when cultivated. (Blue.)

Class V. Land that is too wet or stony or is otherwise not fit for cultivation but needs only ordinary good management to be used safely for trees or grass. (Dark green.)

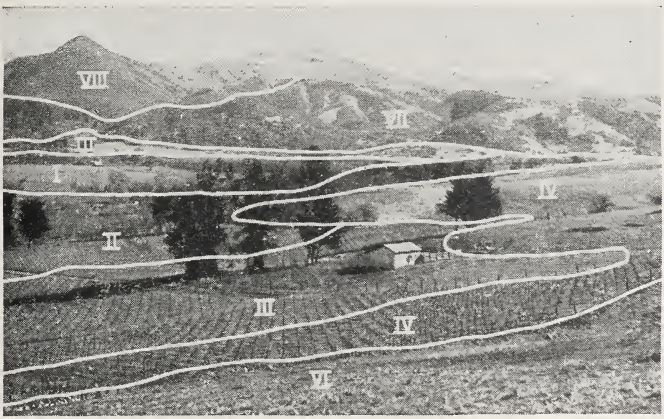
Class VI. Land that is too steep, eroded, shallow, wet, or dry for cultivation but is suited for grazing or forestry if carefully managed. (Orange.)

Class VII. Land that is very steep, eroded, rough, shallow, or dry but can be used for forestry or grazing if handled with great care. (Brown.)

Class VIII. Land that has some limitation that makes it unfit for cultivation, grazing, or forestry but that may be valuable for wildlife, recreation, or watershed protection. It includes such areas as marshes, deserts, badlands, and mountains. (Purple.)

A farmer or rancher may look at his map and quickly see, by the color or Roman numeral, whether a field can be safely cultivated, or whether it should be used for grazing, forestry, or wildlife. But the colors do not show what the conservation problems are. Hence, all classes, except class I, may have two or more subclasses.

Subclasses are shown on the map by the letters e, s, w, and c. If the letter e follows the Roman numeral, like this (IIIe), it means that erosion is the main problem—either the land is eroding or it will begin to erode if not properly protected. The letter s (IVs) means that the soil is not as good as it should be—



it is too shallow, too rocky, too sandy, or is inferior in some other way. The letter w (IIw) means that the land gets too much water—it needs drainage or protection from flood. The letter c (VIIc) means that the climate is not satisfactory—it is either too cold or too dry for ordinary farming. Class I land is not divided into these subclasses because there are no special problems on it.

By following these symbols, a farmer or rancher can readily find out what his main problems are for each field. But he still needs to know exactly what to do to correct or overcome the faults of the land.

Not all land in the same class and subclass necessarily needs the same conservation treatment. For example, one field of class IIIe land might have soil that did not erode easily but have a steep slope, whereas another field of class IIIe land might have easily eroded soil but a gentle slope. Both fields would need protection from erosion but the best conservation treatments might be entirely different for each field.

The kind of conservation treatment needed is shown on the map by land-capability units. These units are indicated by a small Arabic numeral. Thus the entire symbol for each field looks something like this: IIIe–4. The small number may not mean much to a farmer or rancher, but it shows soil conservationists what the land is like, and what is needed. They draw up "conservation guides" to explain the kind of conservation treatment needed for each unit. The guides are given to the farmer or rancher along with the land-capability map.

BASIC CONSERVATION PLANS

A basic conservation plan is made by a farmer or rancher and a technician of the Soil Conservation Service working together. They go over the farm or ranch—acre by acre. They study the kind of soil they have to deal with on each field, pasture, or woodlot—they check with the land-capability map. They discuss all possibilities for each field and for the farm or ranch as a whole. Then the farmer or rancher decides what shall be done on each acre of land.

Here are some of the decisions the farmer or rancher, with

advice from the technician, may need to make in drawing up a basic conservation plan. Should some field boundaries be changed so that all the land in each field is suited for the same use? Should some cultivated fields be changed to pasture or woods, and vice versa? Where should sod waterways be located, and how should they be established? Which fields need drainage, and what kind of drainage system will be best? Is irrigation needed? If it is, what kind of irrigation system will be most efficient?

Should trees, shrubs, grass, diversions, masonry structures, or a combination of these be used to control gullies? Is a terrace system needed? If it is, where should the terraces be located and how should the outlets be established? If strip cropping is used, how wide should the strips be and where should they be located? What kind of crop rotations should be used on each field? What kind of cover crops are needed for each field? Which fields need liming? How much and what kind of fertilizer should be used on each field and pasture?

Which pastures or meadows should be reseeded? What kind of grass and legume seed mixture should be used for planting pastures or meadows? How many head of livestock should be

grazed on each pasture? What system of rotation or deferred grazing is needed? How many and what kind of livestock will the entire farm or ranch support? Where should farm or ranch ponds be located?

When and how shall the trees be cut from the woodlands? What other woodland-management practices are needed? Where shall fireguards be located, and how shall they be made? If trees are to be planted, what species will do best? What shall be done to provide food and cover for wildlife?

Seldom will all these decisions be necessary on one farm or ranch, but many of them will come up on most. And there are many other things, not mentioned here, that must be considered in making a basic conservation plan. The farmer or rancher may already have made some of the decisions by following his land-capability map and conservation guides. But most farmers will want technical advice on some of these choices.

After all decisions and plans have been made by the farmer or rancher, with advice from the planning technician, the plan is put down in writing. This plan then becomes a part of the cooperative agreement between the farmer or rancher and his soil conservation district. The plan may be modified or revised from time to time, but it should serve as the basic plan for all future operations on the farm or ranch.

TECHNICAL AID IN APPLYING CONSERVATION PLANS

A conservation plan, by itself, will not protect and improve the land. The plan must be applied to the land before it will help conserve it. Most farmers and ranchers will be able to apply a great many of the conservation measures called for in their plan. But there will usually be some conservation work that requires more technical skill than the farmer or rancher has.

For example, the laying out of a terrace system or a drainage system requires accurate survey work that can be done best by an engineer. So does the laying out of a field for strip crops or contoured orchards. The design of a pond or an irrigation system should be done by a skilled engineer. The construction of ponds, waterways, flumes, and diversion ditches should be supervised or checked by a technician. So should land leveling

or land smoothing. Likewise, the design and construction of gully-control or other conservation structures are jobs for skilled technicians. Most farmers and ranchers want the help of a technician in applying such practices as these.

All district cooperators can get such help from Soil Conservation Service technicians who are assigned to work with the district. These technicians also help farmers and ranchers who are not district cooperators, provided they are participating in the Agricultural Conservation Program of the United States Department of Agriculture.

CONSERVATION WORK DONE

By 1953 about a fourth of all farmers and ranchers of the Nation were cooperating with their soil conservation districts in planning complete conservation programs. They operated more than a fourth of all farm and ranch land of the country. Also many farmers and ranchers who are not district cooperators are using conservation measures on part of their land.

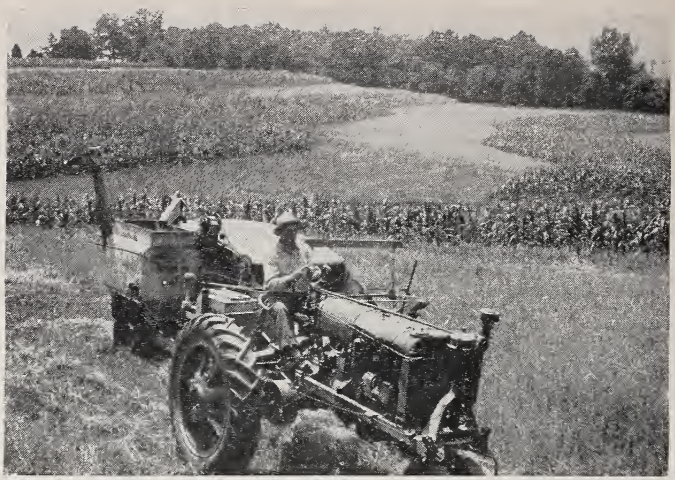
This is good progress, considering that our national soil conservation program was started only in 1933. Yet, the main job still lies ahead.

THE JOB AHEAD

Too many farmers and ranchers have not yet started to practice conservation. After they start, it may take them several years to plan and put into operation a complete conservation program. Even after every farm and ranch has a basic conservation plan, only the first step toward permanent conservation has been made. The plans must be carried out—not just for a few years, but for all time.

At the rate we are now going our soils are deteriorating faster than we are building them up. Erosion is still taking a heavy toll on many farms. On even more farms native soil fertility is still on the downgrade. Much of the soil humus has been burned out on our most productive land.

About a fourth of our cropland is still being damaged at a critical rate. Yields will be much lower on this land within the next 10 to 15 years if we don't protect and improve it. Another



fourth is deteriorating at a less rapid but still serious rate. This land should be protected and improved within 15 to 30 years if it is to stay productive. This means that about half of our cropland will produce less and less each year if we continue to farm it as we have in the past. But we can conserve this land and make it more productive if we use the right kind of conservation farming methods.

The other half of our cropland is not in immediate danger; in fact some of it is not deteriorating at all. This does not mean, however, that this land is producing all it can. Better conservation farming methods would increase production on most of it.

We have enough good land left in this Nation to keep us prosperous and well fed if we conserve and improve it. We know that we can do this, and we know how to do it. We can make most of our land produce more and more, year after year. But—will we do it in time?

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